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ABSTRACT

The feasibility of using technology as an instructional strategy to help adult students make the transition from volunteer literacy programs to adult basic education classes was assessed. The following benefits of technology as an instructional strategy were examined: privacy, individualization, achievement gains, cost-effectiveness, control of learning, open entry/open exit, and the fact that technology is recognized as the modern way to learn in the workplace. The following barriers to using technology as an instructional strategy were identified: constant change, high cost, pressure to make rapid decisions, lack of expertise and training, inappropriate instruction, curriculum integration, and role changes. Discussed next were technology's role as empowerment and a bridge and the instructor's role in using technology. The following characteristics of instructional technology were considered: interactivity, feedback, learner control, learner-controlled accessories, directions and help, consistency, organization, and graphics. Also examined were the following: available types of educational software, the assessment and recordkeeping features of computer-assisted instruction, the use of technology labs and small groups as learning environments in which technology may be used as an instructional strategy, special opportunities afforded by technology in working with learners of English as a Second Language and special needs students, and integrated learning systems. (Contains 37 references.) (MN)

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TRANSITIONS

Technology as an Instructional Strategy for Program Transitions

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The recently released report from the Office of Technology Assessment or OTA (U.S. Congress, 1993) portrays the fragmentation of service delivery and the promise of technology to meet the great needs revealed by the National Adult Literacy Survey (Kirsch, Jungeblut, Jenkins, & Kolstad, 1993). Implicit in the OTA report is the lack of coordination between the volunteer sector, providing primarily one-to-one tutoring, and publicly funded adult basic education, usually offering group instruction by a paid instructor. The OTA report recommends governmental and private expenditures for technology to deliver services to all the adults in need regardless of the type of program.

This paper addresses how technology as an instructional strategy may help adult students make the transition from volunteer literacy programs to adult basic education classes. As background to this discussion, effective literacy instruction that is relevant and meaningful to adult students, regardless of the type of service provision, will be described. Then, the focus will be on using technology to deliver effective literacy instruction which can assist learners in the transition from literacy to adult basic education programs.

Effective Literacy Instruction

Sometimes called learner-centered instruction, good literacy instruction focuses on what students want and need to learn rather than on a predetermined, generic curriculum usually delivered by a commercial set of materials. Also called the "functional context" approach to instruction (Sticht, 1987), where the context of basic skills instruction is relevant and meaningful to learners, good literacy instruction has these characteristics:

- Adults are goal-oriented. Functional context instruction is motivating to the learner because it is meaningful and relevant to the adult student's goals and needs. Harman (1985) suggests that "hard-to-reach" adults are best reached in programs where literacy is not the main goal but a tool to reach other goals. Functional context instruction has more intrinsic value to the learner than learning basic skills without a relevant context (Sticht, 1987).
- With prior knowledge and life experience, workers can read and interpret job-related materials at higher levels than they can read non-job-related materials (Diehl & Mikulecky, 1980). Similarly, adults, using their background knowledge and experience, can read more difficult materials that are relevant to their families, culture, neighborhoods, and other aspects of their lives. The terminology is familiar and the concepts are those used daily. Thus, if a program aims to improve work-related literacy skills, for example, it would be counterproductive for learners to work with generic materials when they could be working at a higher level with job-related materials.

Effective literacy instruction that is relevant to adults' background knowledge and experience provides a framework for discussing technology as a strategy for transitions. The

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next consideration is the characteristics of technology that meet the learning needs of adults who are making the transition from volunteer programs to adult basic education classes. The benefits as well as the barriers to using technology have been discussed in the research literature (Askov & Clark, 1991; Mansoor, 1993; Turner, 1993; U.S. Congress, 1993); they are summarized here.

Benefits of Technology as an Instructional Strategy

The research literature reports the following benefits of using instructional technology:

Privacy. Only the adult and his/her teacher or tutor need to know the actual level of instruction. Once the adult student learns how to operate the computer, he/she can work independently without anyone's knowledge (other than the teacher or tutor) of the appropriate level of difficulty.

Individualization. Instruction can be tailored to the adult student's needs rather than to those of the group. The teacher or tutor can individualize not only the pace of learning but also the content and presentation to the needs and interests of the individual adult student.

Achievement Gains. Some research studies have demonstrated better than average gains through use of technology (for example, Askov, Maclay, & Bixler, 1992). Although Clark (1983) cautions appropriately that achievement gains may not be related to the medium of instruction but to the content, adoption of technology causes teachers to rethink the curriculum which is positive and generally leads to better instruction (Papagiannis, Douglas, Williamson, & LeMon, 1987).

Cost Effectiveness. An extensive evaluation (Turner & Stockdill, 1987) of an urban technology/literacy center revealed that delivering instruction through computers is no more expensive than traditional instruction with advantages in achievement gains. In fact, more students than originally anticipated could be served through using technology in instruction.

Control of Learning. The adult student gradually takes control of the learning situation as he/she learns how to use the technology. Askov and Brown (1988) and Lewis (1988) documented changes in attitudes toward oneself as an adult learner. Controlling technology seems to lead to a sense of empowerment for low-literate individuals who often feel that they have little control over their own lives.

Open Entry-Open Exit. While classes may operate on a regular schedule, it is common for students to need flexibility in scheduling. Instructional use of technology enables teachers and tutors to start where students leave off, saving valuable time for both. Student records can be easily stored on computer disks, offering a confidential and convenient means of retaining student achievement data.

Modern Way to Learn. Technology is revolutionizing the workplace; business/industry/labor organizations look to technology to upgrade the learning skills of workers. A certain faith in technology exists in the modern mind (Turkle, 1984). This faith can help adult students overcome feelings of inadequacy as they approach the task of learning basic skills as adults (Lewis, 1988). Use of computers, in particular, can also build comfort and familiarity with computers — computer literacy — as well as basic skills instruction.

Barriers to Technology as an Instructional Strategy

Some barriers exist to using technology. A survey of state directors of adult education (Askov & Means, 1993) revealed that the greatest barriers to using computers were funding and staff development. These and other barriers are discussed as problems in using technology as an instructional strategy in assisting adults to make program transitions.

Change. Technology is constantly changing. What seemed "state of the art" several years ago is now "primitive." Continual upgrading is necessary to take advantage of the best that technology has to offer.

Cost. Costs are a major barrier to purchasing technology for instruction. Unless some type of federal and/or state funding is earmarked for technology, purchases are difficult, particularly for volunteer programs, even though costs are coming down.

Pressure to Make Rapid Decisions. Money for technology sometimes comes from an unexpected "windfall," leaving little time to make informed decisions. Instead of careful planning which should precede innovation, administrators must "use it or lose it"; they may fall prey to a sharp salesperson who may not have the best interests of students in mind.

Lack of Expertise. A trained resource person needs to be available to set up the equipment, fix malfunctions when they occur, and, most importantly, train teachers and tutors in the use of the technology. This resource person also needs to keep up with what is happening in not only technology but also adult literacy to keep equipment upgraded and materials current.

Lack of Training. Unfortunately, when program administrators decide to adopt technology, especially computers for instruction, usually the first consideration is hardware and then software. Only after those decisions are made does the realization come that teachers and tutors need to be trained. Instead of training being the first step, it is often an afterthought.

Inappropriate Instruction. Most computer software is designed for children. However, it may be used with adults with adaptations and care in the way it is presented. Many of the instructional games can be used if the graphics are not too obviously childish. As more funding is becoming available for adult instructional programming, vendors are producing more appropriate materials.

Curriculum Integration. It takes time for any innovation to be adapted and adopted in a local program. Similarly, use of a new technology is often viewed as a special event rather than part of the ongoing curriculum. Teachers and tutors must become so familiar with the instructional materials offered via the technology that these materials can become part of the instructional choices routinely available to students.

Role Changes. When students use technology, and have control over their personal learning agendas, they become more independent, even self-actualizing. Sometimes teachers and tutors feel displaced by the technology. Training can overcome these feelings of displacement and give tutors a viable and important role in instruction.

The benefits are mostly related to the adult learners; the barriers are mostly program-related. As states contemplate using technology as an instructional strategy to assist adults to make the transition from volunteer to adult basic education programs, what unique contribution does technology offer?

Technology as Empowerment and a Bridge

Technology can empower adults to take control of their own learning. Of course, technology can deliver poor literacy instruction; it is only the vehicle for delivering instruction. When technology offers effective literacy instruction, as defined above, it empowers adult learners; they become responsible for their learning progress. They develop positive attitudes toward learning, not only for instruction through technology, but for all forms of learning. They feel affirmed not only as learners but also as individuals. As Mr. White, an inmate — and a beginning reader — at a state correctional institution, said, as he picked up and literally hugged the computer he had been working on, "I'm right! I know I'm right!" It was, perhaps, the first time he had been successful in a learning situation. Technology that affirms the learners empowers them.

When adults are affirmed and empowered by their own learning successes, the transition from one learning environment to another is not as stressful. As long as the technology is available for the learners, it is the remaining, familiar constant when transition occurs. It functions as a bridge from one program to another; however, the instructor is still important.

Role of the Instructor in Using Technology

Instead of feeling threatened or replaced by technology, instructors — teachers and tutors — need to consider their new roles. The instructor is still essential to mediate between the technology and the learners. Learners need assistance and additional practice even with the best technologically delivered instruction. Teachers and tutors become facilitators more than direct deliverers of instruction.

Learners need help in transferring the instruction delivered by technology into their daily lives. Instructors can provide the linkage and transfer from the technology to application in learners' lives. For example, if students learn how to calculate with fractions, they can be given recipes with fractional units or drill bits of different sizes (Which is larger—3/8 or 7/16?).

Instructors can also help learners develop their metacognitive (learning how to learn) skills while using technology. In fact, some kinds of technology are ideal for learning and practicing higher level skills that the NALS (Kirsch, Jungeblut, Jenkins, & Kolstad, 1993) revealed were lacking in approximately half the population. Research (for example, Baker & Brown, 1984) reveals that learners who have developed their metacognitive skills are more successful in reading; they will have less difficulty with transition from a volunteer tutoring program to adult basic education classes.

For example, tutors and teachers using technology can ask learners what they already know about the subject they are about to study and what they need to learn. They can query learners about whether or not they have enough information to answer questions and solve problems delivered by the technology. They can encourage students to think about what they need to know to learn new information from their reading. They can encourage students to become problem solvers in their literacy studies, using reading and writing as reciprocal processes. They can discuss what they are learning and learn to listen to others' points of views.

Characteristics of Effective Instructional Technology

Technology that is effective will empower learners and help them make the transition from one literacy program type to another. Technology that can help with transitions should have the following characteristics (Baker & Bixler, 1990; Bixler & Spotts, 1992). While this discussion primarily pertains to computer-assisted instruction (CAI), most of the points are also applicable to other types of technology.

Interactivity. Learners do not learn passively but through active engagement (Tennyson, 1990). If video and television are used for basic skills instruction, they should be accompanied by discussion and practice activities. The advantage of video is that it may be stopped at any point which enhances possibilities of interactivity.

Feedback. Learners need to know whether or not their responses are correct. Feedback should be non-judgmental and private. For example, software that produces a squeak or a buzz when the wrong answer is selected is not advised. Learners should be given an explanation of why an answer is correct, even if they answered correctly, since they may have guessed.

Learner Control. The ability to stop an instructional program at any time and to start again where the learner left off is essential in creating technology that is learner controlled and individualized (Gay, 1986). Some software, for example, that is designed for young children yet used with beginning adult readers does not permit the user to exit the program until it is completed. This feature erodes the learners' self-concepts by letting the technology, rather than the learners, control the pace and delivery of instruction.

Learner-Controlled Accessories. Navigational tools, such as arrows that return learners to the previous screen or back to the menu, are empowering to adults. A built-in dictionary which learners can access at any time presents a word, provides the definition of the word, and uses the word contextually in a sentence. A word processor that learners can access at any point during a lesson

enables them to record notes about and reactions to the lesson, enhancing metacognitive abilities. Learners should be asked to comment on any difficulties they experienced, aspects of the lesson that they enjoyed, and so forth.

Directions and Help. One element many low-literate adult learners share is difficulty in following directions. Directions should be always visible or easily accessible. Learners are prompted step-by-step through difficult exercises. An on-line "help" button should always be available to learners who are confused or forget the directions. The use of speech synthesizers and digitizers is useful for beginning readers to receive aural directions, help, and reinforcement. If speech is an impossibility, instruction for beginning adult readers or non-native speakers should be designed to use the computer as a tool with the teacher or tutor.

Consistency. Placement of directions and graphics on the screen should be consistent wherever possible. Common phrases for all directions should be used. Graphics should appear in the same general area on the screen in sequential exercises where new graphics may replace previous graphics. Providing an explicit organization increases the memorability of new material (Bower, 1970).

Organization. Title screens should notify the learner when a new section is being presented (Murray, 1989). Summary screens inform the learner that a section is finished. Summary screens should also organize and provide a synopsis of the material presented. Instructional segments should be short to accommodate attention spans that may be short. Dividing instruction into modules, units, and subunits gives adults a sense of accomplishment; finished sections should be displayed in the record-keeping system for both instructors and adult learners to see.

Graphics. Literacy instruction that incorporates simple but appealing graphics provides cues to meaning and assists in learning (Bean, Singer, Sorter, & Frazee, 1986). Furthermore, attractive graphics keep the learners' attention focused on the task (Hannafin & Peck, 1988). In CAI screens should be "sparse" in terms of verbal and content density wherever possible. Screens that are clutter-free, without unnecessary details, allow the learners to concentrate on the concept intended. Simple line drawings without any extra detail, shading, or fill patterns enhance a concept. The use of large print fonts also limits the amount of information placed on one screen, and it may be more readable for older adults.

Assessment and Recordkeeping. Diagnostic and mastery tests that are built into the technology are extremely useful when learners move from one type of program to another. The tracking system should inform learners of the materials and activities to review before proceeding, and whether or not learners should seek outside assistance.

Customization. If possible, technology should be open-ended to allow instructors to enter their own materials, such as words, definitions, and sentences. Customization allows the technology to be designed by the instructor to fit the unique needs of particular students. Some commercial CAI programs offer the customization feature not only for instruction but also assessment.

Instructor's Manual. A detailed, graphically-oriented manual is essential, preferably one that displays what the learners are seeing in the technology. Since inadequate staff training is often a problem, a well-written manual in non-technical language is essential.

Computer Software for Instruction

Schank (1994) discusses "natural learning" using technology that simulates the real world, offering instruction in a simulated environment. In contrast to outmoded methods used in early CAI, simulations take on a problem-solving approach so that learners are engaged rather than passive recipients.

Five types of computer software exist: Drill and practice, games, tutorials, simulations, and problem solving. Most software on our shelves is drill and practice because old hardware could not run anything else. Expanded memory capabilities now permit simulations and problem-solving software.

With costs coming down, programs are advised to purchase new equipment. The old hardware is still useful for running drill and practice exercises which are needed for reinforcement.

Simulations are possible now on the newer, more powerful computers. For example, we can now simulate the work environment; it is easier and less expensive to have learners work in a simulated environment where mistakes do not cost anything. Learners have privacy and freedom to experiment. Through computer simulations they are able to apply their new skills to their daily lives (in a simulated environment), enhancing transfer of skills. Computer simulations act as a bridge between classroom learning and the real world.

Simulations require learners to apply their basic skills; learners should be able to access tutorials whenever they need skills instruction. Ideally, they should be able to suspend the simulation and move into the tutorial, using software navigational tools. The tutorials should contain critical thinking and problem solving as well as drill and practice. Then they can return to the simulation and apply the basic skills that they have just learned.

An example might help. The Institute for the Study of Adult Literacy at Penn State has been developing simulations for workplace/workforce literacy for about seven years. The job tasks that a worker must do are determined by task analysis; then basic skills are related to those job tasks. One job task for maintenance workers, for example, is painting a room. The computer simulates the entry-level worker arriving for the day, reading the supervisor's memo with instructions for the day, measuring and calculating the area of the room to be painted, figuring out how much paint is needed by reading the paint can label, selecting the correct tools, taking safety precautions indicated on the label, and so forth. At any point that the learners do not know how to do a job task, such as calculating the area of the room, they can interrupt the scenario to receive contextually appropriate instruction in a tutorial. (In other words, area is taught in the context of wall measurements.) At the end of the module the learner is given a Manager's Training Report showing successfully and unsuccessfully completed job tasks. Learners take control of their own learning. They determine when and if they need tutorials. If they do not select a tutorial when they do not know how to apply a skill, they will probably not succeed at the job tasks. It is just like the real work world, but mistakes don't cost wasted paint!

Interactive videodisk and CD-ROM technologies offer the opportunity to use video clips instead of computer simulations. The disadvantage is that shooting video is very expensive; however, existing video footage can be used with the computer interface. Interactive Knowledge of Charlotte, NC, has been using both these technologies to create adult literacy software, especially for the textile industries.

Simple word processing, data base, and spreadsheet programs can also be used to tailor instruction to the needs of individual students. Publications, such as Pollak (1989), can guide teachers in how to use these tools in adult literacy instruction. *Keystrokes for Literacy*, offered in **Playing to Win** centers in Boston and New York, teaches these computer skills along with literacy skills.

Electronic mail offers opportunities for literacy tutorial students to communicate with other students in adult basic education classes. Not only are their reading and writing skills improved through using electronic mail, but they can also find out about instruction in the group setting. Electronic mail is an easy way for tutors to communicate with teachers about the learners who are making the transition from one program to another.

Teachers might start software review by looking for different types of programs, keeping in mind that no software program will be universally useful to the needs of all individual students and all literacy programs. Droms (1992) offers useful suggestions for evaluating software. Also the annual software evaluations (Wright, 1993) of the northwestern states are extremely valuable since learners as well as teachers evaluate the software each year.

Assessment and Recordkeeping

One of the great strengths of CAI over other technologies is its ability to track a learner's progress. If learners work together in pairs or in a small group on a computer, their progress can be tracked as a group. Assessments can occur individually so that individual records can be kept, but instruction can be offered for the pair or group.

Computer record-keeping is ideal for learners in transition between programs. If a diagnostic profile of a learner's strengths and weaknesses is kept and updated, learners can move from one program to another without having to undergo placement testing again. Quigley (1992) points out that the assessment process often discourages learners in pointing out what they cannot do and reminds them of unhappy school experiences. Computer record-keeping eliminates the need for reappraisal since students can take their records with them into a new program. Further diagnosis can be accomplished informally (Lytle & Wolfe, 1989) and through portfolio assessment (Tierney, Carter, & Desai, 1991).

Portfolio analysis is becoming popular in adult literacy as a more authentic assessment of a learner's abilities (Fingeret, 1993). Computer technology could resolve one of the biggest problems with this approach, namely the issue of who owns the portfolio when a student leaves a program. Students often want to keep the portfolio of their best work. However, tutors and teachers may need it to communicate the student's capabilities as the student moves from one program to another. Furthermore, as portfolio assessment replaces more formal forms of testing, the portfolio is the evidence of the student's accomplishments which can be used in program evaluation.

The portfolios of papers are cumbersome in cramped instructional quarters, however, and sometimes papers slip out and are lost. If a student prepares his/her writing samples on a computer, these can be stored on an individual computer data disk in addition to paper in a folder. Other materials can be scanned into the computer and also stored on disk. The portfolio on a student data disk is a way for the accomplishments of the student to be transmitted from one program to another, easing the transition for both programs.

As norm-referenced testing gives way to more authentic assessments, criterion-referenced assessment is becoming recognized as an important source of information (Askov, 1993). Instead of comparing a learner to others through a grade level score, the learner is assessed in terms of his mastery of skills. Criterion-referenced assessment makes more sense in providing not only diagnostic information about individuals but also data for program accountability. Criterion- referenced assessments and the accompanying record-keeping system are easily handled by computers, again being kept on an individual student's computer data disk.

The Institute for the Study of Adult Literacy has been developing computer-based, criterion-referenced assessments of basic skills in five job clusters. Two modes of assessment are possible: *Learning* where the learner is dynamically allowed to change his/her answers based on learning during the assessment and *Test* where the assessment is used for program evaluation or pre/post measurement. Used in *Learning* mode, where the student has the opportunity to change his/her answers based on learning from the items, assessments can also instruct learners. Either mode — *Learning* or *Test* — can be selected by the instructor for individual adult students. The computer records student responses to criterion-referenced assessment items in easily accessible reports which can accompany students as they make transitions from one program to another. It also keeps a record of all typed responses, including free response items and student's writing in the "pull down" word processor.

Types of Technologies

Other recent reports (Mansoor, 1993; Turner, 1993; U.S. Congress, 1993) discuss characteristics of the various technologies and the promises they hold for literacy instruction. Rather than repeat the descriptions of the various technologies, this report concludes that the use of the technologies is more

crucial to the transition issue than the type of technology. For example, while video is generally recommended for ESL and beginning readers (Mansoor, 1993), it does not offer effective instruction unless it is used interactively; the technology, in and of itself, is not as important as the ways in which it is used.

Types of Learning Environments

The environment in which technology is used affects the ease of transition from a volunteer tutoring to adult basic education program. Perhaps more important than the physical setting is the staff's attitude toward learners' use of technology. The willingness to be flexible in designing instruction is crucial. Putting everyone through the same technologically delivered instruction is not a solution to the transitions dilemma. Two settings are considered below.

Technology Lab. A drop-in learning lab setting may be the most conducive to transitions. Beginning readers are tutored in the lab setting; the tutor offers a combination of print- and technology-based instruction. As learners progress, they gradually take more responsibility for their learning. They keep track of their own progress, and they learn how to operate the instructional programs that they are using. The transition from the volunteer tutoring to adult basic education is not abrupt as learners move from a tutoring relationship supplemented by technology to instruction which is primarily delivered by technology monitored and assisted by a paid instructor.

A good example of this model is the Technology for Literacy Center; although part of the St. Paul (MN) School District, it is located in a shopping mall (Turner, 1993). This setting has the additional advantage of maximum flexibility of scheduling for students; many types of technologies are available to the learners.

The Center for Literacy, the largest community-based literacy organization in Pennsylvania and located in Philadelphia, has a computer lab in a centrally located school. Learners from any program, including tutorials and classes, can drop into the lab and work on the various software programs. Tutors can also come with their students to the lab for supplemental work. The lab is staffed by former students who know the software programs from personal experience.

On a smaller scale, the Women's Program at the Lutheran Settlement House in Philadelphia has a computer lab in one of their classrooms. The lab is staffed by a VISTA volunteer who works with classes of students. The difficulty of this model, as in the case of the other Philadelphia program, is that close coordination is required between the instructor or tutor and the lab instructor who should know what the students need. Most of the instructors are part-time employees who do not have the opportunity to use the software so that they know what the various programs teach. The VISTA volunteer, however, has been able to communicate with the instructors to overcome some of these problems. The students assume responsibility for their own record-keeping and progress which encourages independence and empowerment of the learners.

Small Groups. Although the usual model for computer use is one learner per computer, two or three learners can use a single computer which offers an obvious economy since more learners can be served at one time. The real advantage, however, is that weaker students can be helped by more advanced learners. Peer instruction is effective not only for the less advanced student but also for the one who is assisting. For learners who are making the transition from volunteer tutoring to classes, peer tutoring, using computer software to deliver the lessons, is an ideal supplement to group instruction. The small groups can also work off-line in teacher-delivered instruction and group practice activities. The Tri-County OIC in Harrisburg uses this model in delivering instruction both at its instructional site and in the workplaces it serves.

Additional Considerations

Technology offers some special opportunities in the transition from volunteer

tutoring to adult basic education classes as described below.

ESL Learners. While the recent Southport Institute report by Mansoor (1993) recommends technology for ESL learners, some learners reject technology in instruction because it does not fit the traditional model of instruction. In the minds of those learners the teacher is the authority; their role is to sit quietly and listen. Technology is considered frivolous, more appropriate as a game than a learning tool.

Good language learning, however, is interactive; students must use their English language skills. Technology can be used to break out of the traditional mold of instruction. Videos can present common situations which require certain language responses. After watching the videos, learners can role play the situations, such as calling a supervisor to report the need for a sick day.

The interactive videodisk created in South Australia entitled *The Aussie Barbie* (Anderson, 1991) uses the context of an Australian barbecue to demonstrate the appropriate language for a social event. Learners select appropriate responses to situations from various choices shown on the videodisk; branching occurs depending on their responses. Other programs model correct language patterns. The learner is asked to imitate the phrase which is recorded for both learner and instructor evaluation.

Instead of technology being a cultural barrier, it can help non-native speakers move from volunteer tutoring to group classes. It can be used to mix language groups so that English must be spoken in order to communicate about the lesson presented by technology. As a strategy to aid in transition, technology can bring these mixed language groups together to present good literacy instruction in the functional context of daily life tasks. The group use of the technology provides the support needed for those who are moving from tutoring to group ESL classes. The author of this paper used this model in developing and field testing software in Australia with non-native speakers (Askov & Cole, 1985).

Mansoor's excellent report (1993) on technology in ESL programs summarizes the research as well as provides insights into policy and practice. While it does not deal with the transition issue directly, it does provide an extremely useful look at technology for this subpopulation of adult learners.

Special Needs Learners. Students with learning difficulties may especially benefit from technology. The self-paced nature of CAI can reinforce concepts and skills with infinite patience. These learners need multiple presentations of literacy skills in order to learn them. They also need to be taught how to transfer literacy skills learned in one or media to new situations. Various technologies combined with print reinforcement provide multiple opportunities in learning literacy skills. Tutors and teachers alike can capitalize on the strengths of technology for these learners, easing the transition from one type of program to another.

Integrated Learning Systems (ILS). The capability of an ILS to offer instruction, usually by computer, for all learners regardless of level is appealing. While big systems offer opportunities for learners at all levels, and ease transition from volunteer tutoring to adult basic education classes, they do not use a functional context approach to instruction. It is very difficult to customize these learning systems to a unique group of learners. However, they may be used as a basis for literacy skill development with supplementary instruction focusing on the needs of local learners.

It is possible to create ILS-like packages of software, using commercial record-keeping software. As long as an assessment and record-keeping system is in place, various types of technologies can be included in the simulated ILS.

Both Mansoor (1993) and Turner (1993) offer excellent discussions of the commercial ILS. Their major drawbacks are their expense, generic instruction, and lack of customization. Their major appeal is their ease of use, not requiring a highly trained staff, although research has shown that a more highly trained

staff got better results with an ILS (Nurss, 1989).

A Final Note

If technology is to be exploited for its many capabilities in helping adults make transitions from one program to another, funding from the federal and state governments needs to be addressed at the policy level. Volunteer literacy programs do not have the resources for technology purchases in spite of the fact that instruction, assessment, and record-keeping could be much more effective and efficient with technology. Along with funding for technology must come staff development to upgrade the capabilities of personnel in all types of programs to capitalize on the power that technology has to offer.

In summary, technology can contribute to successful program transitions by:

- building learners' self-esteem and empowerment so that students take control of their own learning;
- forming a bridge from one program type to another;
- providing record-keeping to shorten the reassessment process;
- encouraging communication between the volunteer tutor and adult basic education teacher;
- offering opportunities for peer tutoring and small group work using technology.

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